

1                   **CAPTURING TEST/EMULATION AND ENABLING REAL-TIME**  
2                   **DEBUGGING USING AN FPGA FOR IN-CIRCUIT EMULATION**  
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4                   **ABSTRACT OF THE DISCLOSURE**

5                   A method for obtaining real-time debug information, e.g., state information  
6                   and trace information, from an FPGA acting as a virtual microcontroller that is  
7                   attached to a microcontroller under test. The two devices, the microcontroller and  
8                   the FPGA execute the same instructions in lock-step with the FPGA acting as an  
9                   emulator. The FPGA emulates the actual microcontroller and relieves the actual  
10                  microcontroller from having debug logic installed thereon. FPGA and  
11                  microcontroller, are coupled using a four pin interface. The FPGA is directly  
12                  coupled to the PC for both programming and control. The system is implemented  
13                  such that the microcontroller forwards information regarding I/O reads, interrupt  
14                  vector information and watchdog information to the FPGA in time before the  
15                  execution of the next instruction. Thus, the FPGA has an exact copy of the state  
16                  information of the microcontroller.  
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